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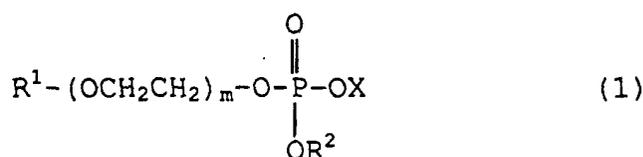
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(54) **DETERGENT COMPOSITION**

(57) Detergent compositions each of which comprises (A) at least one phosphate ester or a salt thereof represented by the following formula (1):



wherein R¹ represents a C₈-C₁₈ hydrocarbon group, m stands for a number of from 0 to 10 on weight average, X represents H, an alkali metal atom, ammonium, a basic amino acid residual group, or an alkanolamino group having a hydroxy(C₂-C₃ alkyl) group, and R² represents -(CH₂CH₂O)_m-R¹ or X, or a mixture thereof, and (B) at least one glyceryl ether having a C₄-C₁₂ alkyl or alkenyl group.

These detergent compositions are low in skin irritation and are good in foaming performance.

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[0011] On the other hand, examples of the branched hydrocarbon group as R^1 , which has 8 to 18 carbon atoms, include methyl-branched hydrocarbon groups represented by $R^3\text{-CH}(\text{CH}_3)\text{CH}_2\text{-}$ (R^3 represents a linear hydrocarbon group having 5 to 12 carbon atoms), with methyl-branched alkyl groups being particularly preferred. Illustratives of the linear hydrocarbon group having 5 to 12 carbon atoms represented by R^3 are linear alkyl or alkenyl groups having 5 to 12 carbon atoms, with linear alkyl groups such as pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl and dodecyl being particularly preferred. In addition to these methyl-branched alkyl groups, α -branched alkyl groups such as ethyl-branched, propyl-branched, butyl-branched and pentyl-branched alkyl groups can also be used.

[0012] In the formula (1), m is preferably from 0 to 5 on weight average. More preferably, m ranges from 0 to 3, with 0 being especially preferred.

[0013] R^2 is $\text{-(CH}_2\text{CH}_2\text{O)}_m\text{-R}^1$ or X, in which R^1 , m and X have the same meanings as defined above. Preferred as R^2 is $\text{-(CH}_2\text{CH}_2\text{O)}_m\text{-R}^1$, in which m is from 0 to 5 and R^1 is the above-mentioned preferred group or a hydrogen atom.

[0014] Examples of the alkali metal as X include lithium, sodium, potassium and the like; examples of the basic amino acid for the basic amino acid residual group as X include arginine, lysine, histidine, ornithine and the like; and examples of the alkanolamine for the alkanolamino group as X include triethanolamine, diethanolamine, monoethanolamine and the like.

[0015] Among the phosphate esters and the salts thereof represented by the formula (1), particularly preferred are phosphate monoesters each of which has a dodecyl group or a linear or branched alkyl group having 8 to 15 carbon atoms; and their sodium, potassium or triethanolamine salts.

[0016] The component (A) can be a mixture of one or more of phosphate monoesters or diesters, or salts thereof, all of which are represented by the formula (1). In the case of a mixture of a phosphate monoester and a phosphate diester, the phosphate monoester preferably amounts to at least 65 wt.% of the mixture.

[0017] From the standpoint of foaming properties, the component (A) may be added in a proportion of from 2 to 60 wt.%, preferably from 5 to 40 wt.%, more preferably from 10 to 35 wt.%, most preferably from 10 to 30 wt.% based on the whole composition.

[0018] The term "glyceryl ether" as the component (B) means glyceryl mono-, di- or tri-alkyl or alkenyl ether. Usually, the mono- or di-alkyl or alkenyl ether is used, with the monoether being particularly preferred. The alkyl or alkenyl group is a linear or branched alkyl or alkenyl group having 4 to 12 carbon atoms, preferably a linear or branched alkyl group having 4 to 12 carbon atoms. For example, n-butyl, isobutyl, tert-butyl, n-pentyl, isopentyl, n-hexyl, isohexyl, n-heptyl, n-octyl, 2-ethylhexyl, n-nonyl, n-decyl, n-undecyl and n-lauryl can be exemplified. In particular, glyceryl mono- or di-alkyl ethers having one or two alkyl groups having 4 to 11 carbon atoms, more preferably 6 to 10 carbon atoms, particularly 8 carbon atoms (C_8 -alkyl), specifically glyceryl mono (C_8 -monoalkyl) ethers, for example, glyceryl n-octyl monoether and glyceryl 2-ethylhexyl monoether are preferred.

[0019] As the glyceryl ether, the component (B), one or more glyceryl ethers can be used in combination. From the standpoint of foaming properties, the glyceryl ether may be added in a proportion of from 0.1 to 30 wt.%, preferably from 0.5 to 15 wt.%, more preferably from 1 to 10 wt.%, most preferably from 1 to 5 wt.% based on the whole composition.

[0020] The detergent composition according to the present invention may preferably be formulated into an aqueous liquid form using water as a medium. Components employed in ordinary detergent compositions can also be added as needed, including, for example, humectants such as propylene glycol, glycerin, diethylene glycol monoethyl ether, sorbitol and panthenol; conditioning components such as cationic polymers, silicone compounds and derivatives thereof; pearling agents such as ethylene glycol distearate; nonionic surfactants such as polyoxyethylene alkyl ethers, alkyl polyglucosides, glycerin fatty acid esters, and polyglycerin fatty acid esters; amphoteric surfactants such as amidopropyl betaines; anionic surfactants other than the component (A); cationic surfactants such as cetyltrimethylammonium salts; colorants such as dyes and pigments; viscosity controlling agents such as methylcellulose, polyethylene glycol and ethanol; pH adjusters such as citric acid and potassium hydroxide; salts such as sodium chloride, plant extracts, preservatives, antimicrobial agents, chelating agents, vitamins, anti-inflammatories, antidandruff agents, perfumes, color additives, UV absorbers, antioxidants, and cooling agents.

[0021] The detergent composition according to the present invention can be produced by a conventional method.

[0022] The detergent composition according to the present invention may be adjusted preferably to pH 5 to 10, especially to pH 5.5. to 7.

Examples

Example 1

[0023] Detergent compositions of the formulations shown in Table 1 were produced by a conventional method and were evaluated with respect to foamability and irritation. The results are also presented in Table 1.

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(Evaluation methods)

(1) Foamability

5 **[0024]** A 20-fold aqueous dilution of a detergent composition was prepared, and 100 mL (solution temperature: 40°C) of the solution were poured into a 1000-mL graduated cylinder. A 4-blade stirrer of 5 cm in diameter was then placed in the solution. The volume (mL) of foam which had generated subsequent to stirring at 1, 000 r/min for 30 seconds was measured, and the foam volume was ranked in accordance with the following standard. Incidentally, the stirrer was reversed at every five seconds.

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- A: 200 mL \leq foam volume
- B: 150 mL \leq foam volume < 200 mL
- C: foam volume < 150 mL

15 (2) Irritation

[0025] A 5-fold aqueous dilution of a detergent composition was prepared, and 10 mL aliquots of the aqueous solution were placed in glass cups of 3.5 cm in diameter attached to the forearms of 10 expert panelists and were kept in contact with their skins for 30 minutes a day. After the test was conducted for three successive days, the condition of each skin was ranked in accordance with the following standard.

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- A: Desquamation was observed on not more than 5 panelists.
- B: Desquamation was observed on 6 or more panelists, but no erythema was observed.
- C: Desquamation and erythema were observed on 6 or more panelists.

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Table 1

Component (wt.%)	Invention product		Comparative product	
	1	2	1	2
Potassium salt of a phosphate ester (A)* ¹	20			20
Triethanolamine salt of a phosphate ester (B)* ²		20		
Sodium polyoxyethylene (3) lauryl ether sulfate			20	
n-Octyl glyceryl ether	3	3	3	
Purified water	Balance	Balance	Balance	Balance
Foamability	A	A	A	C
Irritation	A	A	B	A

(A) *¹: A phosphate ester produced using "DIADOL 115L" (product of Mitsubishi Chemical Corporation) as a feed alcohol [a 47:31:22 (by weight) mixture of three phosphate esters P₁₁, P₁₃ and P₁₅ of the formula (1) in which m=0, R²=H, and R¹=C₁₁-, C₁₃-, C₁₅- (methyl-branched) alkyl groups, respectively]

(B) *²: A phosphate ester produced using lauryl alcohol as a feed alcohol (in the formula (1), R¹=C₁₂-linear alkyl, m=0, and R²=H)

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Example 2

[0026] A body wash of the following formulation was produced by a conventional method.

[0027] The thus-obtained body wash was excellent in foamability and low in irritation.

Table 2

(Components)	(wt.%)
Potassium salt of the phosphate ester (A)* ¹	15
Lauric acid amidopropyl betaine solution (30%)	10
Lauryldiethanolamide	2
n-Octyl glyceryl ether	2
Perfume	0.5
Purified water	Balance

[(A)*¹ is as defined above.]

Example 3

[0028] A facial wash of the following formulation was produced by a conventional method.

[0029] The thus-obtained facial wash was excellent in foamability and low in irritation.

Table 3

(Components)	(wt.%)
Potassium salt of the phosphate ester (A)* ¹	30
n-Octyl glyceryl ether	2
Glycerin	20
Perfume	0.3
Purified water	Balance

[(A)*¹ is as defined above.]

Example 4

[0030] A facial wash of the following formulation was produced by a conventional method.

[0031] The thus-obtained facial wash was excellent in foamability and low in irritation.

Table 4

(Components)	(wt.%)
Sodium salt of the phosphate ester (A)* ¹	30
Lauric acid amidopropyl betaine solution (30%)	8
n-Octyl glyceryl ether	1
Aqueous sorbitol solution (60%)	25
Perfume	0.3
Purified water	Balance

[(A)*¹ is as defined above.]

Example 5

[0032] A body wash of the following formulation was produced by a conventional method.

[0033] The thus-obtained body wash was excellent in foamability and low in irritation.

Table 5

(Components)	(wt.%)
Potassium salt of the phosphate ester (A)* ¹	10
2-Ethylhexyl glyceryl ether	2
Glyceryl monolaurate	2
Perfume	0.3
Purified water	Balance

[(A)*¹ is as defined above.]

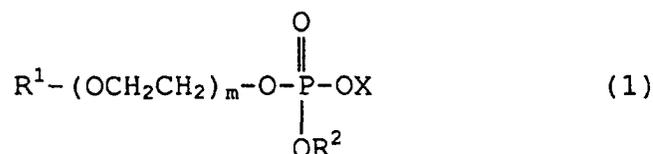
Industrial Applicability

[0034] Detergent compositions according to the present invention are low in skin irritation and good in foamability. Therefore, the detergent compositions of the present invention can be formulated, for example, as detergents for personal washing such as shampoos, body washes, facial washes and hand washes.

Claims

1. A detergent composition comprising:

(A) at least one phosphate ester or a salt thereof represented by the following formula (1):



wherein R¹ represents a linear or branched hydrocarbon group having 8 to 18 carbon atoms, m stands for a number of from 0 to 10 on weight average, X represents a hydrogen atom, an alkali metal atom, ammonium, a basic amino acid residual group, or an alkanolamino group having a hydroxyalkyl group of 2 to 3 carbon atoms, and R² represents -(CH₂CH₂O)_m-R¹ or X, or a mixture thereof, and (B) at least one glyceryl ether having an alkyl or alkenyl group of 4 to 12 carbon atoms.

2. The composition according to claim 1, wherein said glyceryl ether, the component (B), is a linear or branched alkyl monoether.

3. The composition according to claim 1 or 2, wherein said glyceryl ether, the component (B), is a monoether having an alkyl group of 6 to 10 carbon atoms.

4. The composition according to claim 1, 2 or 3, wherein the monoester in said phosphate ester as the component (A) amounts to at least 65 wt.% based on a total amount of the monoester and diester.

5. The composition according to any one of claims 1-4, wherein in said phosphate ester as the component (A), R¹ in the formula (1) is a linear or branched hydrocarbon group having 8 to 15 carbon atoms.

6. The composition according to any one of claims 1-5, wherein the phosphate ester as the component (A) is a phosphate ester having an α-branched alkyl group.

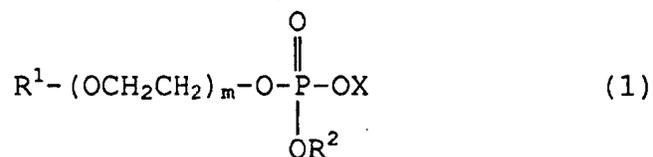
7. The composition according to any one of claims 1-6, wherein the content of said component (A) is from 2 to 60 wt.% based on the whole composition.

8. The composition according to any one of claims 1-7, wherein the content of said component (B) is from 0.1 to 30 wt.% based on the whole composition.

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9. Use of the detergent composition according to any one of claim 1-8 as a detergent for personal washing.

10. A method for enhancing foamability which comprises adding at least one glyceryl ether having an alkyl or alkenyl group of 4 to 12 carbon atoms to a detergent composition comprising at least one phosphate ester or a salt thereof represented by the following formula (1):



wherein R¹ represents a linear or branched hydrocarbon group having 8 to 18 carbon atoms, m stands for a number of from 0 to 10 on weight average, X represents a hydrogen atom, an alkali metal atom, ammonium, a basic amino acid residual group, or an alkanolamino group having a hydroxyalkyl group of 2 to 3 carbon atoms, and R² represents -(CH₂CH₂O)_m-R¹ or X, or a mixture thereof.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP00/07044

<p>A. CLASSIFICATION OF SUBJECT MATTER Int.Cl⁷ C11D1/34, 3/20, A61K7/50, 7/075</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>																												
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) Int.Cl⁷ C11D1/34, 3/20, A61K7/50, 7/075</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>																												
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DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>JP, 8-165235, A (Kao Corporation), 25 June, 1996 (25.06.96), Claims; example (Family: none)</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>JP, 5-125086, A (Kao Corporation), 21 May, 1993 (21.05.93), Claims; example (Family: none)</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>JP, 3-153796, A (Tama no Hada Sekken K.K.), 01 July, 1991 (01.07.91), Claims; example (Family: none)</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>JP, 6-212190, A (Kao Corporation), 02 August, 1994 (02.08.94), Claims; example (Family: none)</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>EP, 474023, A1 (Kao Corporation), 11 March, 1992 (11.03.92), Claims; example & US, 5344650, A & JP, 4-112810, A</td> <td>1-10</td> </tr> </tbody> </table> <p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.</p> <table border="1"> <tr> <td> <p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; 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